

A Secondary Tool for Demarcation Problem: Logical Fallacies

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Abstract: According to Thagard, the behavior of practitioners of a field may also be used for demarcation between science and pseudoscience due to its social dimension in addition to the epistemic one. I defended the tendency of pseudoscientists to commit fallacies, and the number of fallacies they commit can be a secondary tool for demarcation problem and this tool is consistent with Thagardian approach. In this paper, I selected the astrology as the case and I revealed nine types of logical fallacies frequently committed by astrologers while introducing their field and/or defending their claims against the scientific inquiries and refutation efforts. I also argued that recognizing these fallacies may help the audience to demarcate between the scientific and the pseudoscientific arguments.

Keywords: Demarcation problem, Philosophy of science, Pseudoscience, Astrology, Logical fallacies

Ayrım Problemi İçin İkincil Bir Araç: Safsatalar

Özet: Thagard'a göre sözdebilimlerin epistemolojik boyutunun yanı sıra sosyal boyutu da bulunmaktadır ve bilim ve sözdebilim ayrım probleminde bir alanın uygulayıcılarının davranışları da bir araç olarak kullanılabilir. Bu makalede sözdebilimcilerin mantıksal safsata kullanmaya olan eğilimleri ve safsataya başvurma sıklıklarının bilim-sözdebilim ayrımında kullanılabilecek ikincil bir araç olduğu savunulmaktadır. Örnek olarak astroloji sözdebilimi seçilmiş ve astrologların alanlarını tanıtırken ya da savunurken sıklıkla başvurdukları dokuz mantıksal safsataya yer verilmiştir. Ayrıca bu safsataları tanımanın bilimsel ve sözdebilimsel argümanları ayırt edebilmede yardımcı olacağı ileri sürülmüştür.

Anahtar Kelimeler: Ayrım problemi, Bilim felsefesi, Sözdebilim, Astroloji, Mantıksal safsatalar

1. Demarcation Between Science and Pseudoscience

Pseudosciences are a group of beliefs and practices that are often mistakenly considered scientific based ("Pseudoscience" 2015), or the disciplines that appear to be science but are far from meeting standards of science (Horowitz 2005). Despite the pseudosciences are clearly defined in the dictionaries and encyclopedias, academia offers no precise definition

of pseudoscience, nor does it provide an exact definition of science (Schoijet 2009). There is, however, a consensus on the idea that the pseudosciences are disciplines designed to produce valid arguments while steering clear of science's stricter standards (Pavić 2013). In other words, pseudoscience is a sort of anti-science, one that not only misrepresents true science but also portrays itself as a superior alternative to science (Holton 1992).

Throughout the 20th century, pseudoscience was studied in various academic disciplines, by science philosophers such as Popper (2002), Kuhn (1970), Lakatos (1977) and others, all of whom viewed the term from an epistemological angle. These studies focused on the demarcation problem, with a purpose of establishing a genuine definition of *science*, which would emphasize the differences between science and pseudoscience. Several differences (meaning the attributes of science that are lacking in the pseudosciences) include objectivity, testability, verifiability, changeability, reproducibility, cumulativeness, progressiveness, and factuality, as well as predictability (Bunge, 2006, 2011; Lakatos, 1977; Lugg, 1987; Mayo, 1996; Pavić, 2013; Thagard, 1978). Some authors, on the other hand, listed characteristics of pseudoscience that are distinct from science, such as isolation (meaning isolation from mainstream science and rarely participating in academic activities), misuse of empirical data, a lack of cumulative self-correction, pretending to be both traditional and modern, and relying on beliefs rather than empirical or testable data (Beyerstein 1995; Bunge 2011; Gardner 1957).

There are differences between the pseudoscience and mere superstitions, magic and religion. Pseudosciences take the science as a model to get benefit from its prestigious position, while others do not resemble like science (Boudry, Blancke, and Pigliucci 2014). Like authors argued, astronomy serves as the model of astrology. There are more examples: Chemistry for alchemy; quantum physics for new age beliefs, biology and evidence-based medicine for the alternative superstitious medical applications.

There is another approach to pseudosciences, however — one that is psychological, or sociological, rather than philosophical. This approach focuses on the perceived benefits of the pseudosciences, examining them as tools used by the society to fight against the uncertainty of the future. These tools are designed to address individuals' emotional needs, as well as to emphasize fraud, using pseudosciences to trade on these emotional

needs (Lindeman 1998; Merton 1973; Pratkanis 1995; Shermer 2002).

Some authors have turned their faces to practitioners by the name of demarcation. Merton (1973) is one of these authors, and focused on scientists' orientation style in their relationship and communication (known as *the science ethos*), claiming that this style consists of *universalism*, *communalism*, *organized skepticism* and *disinterestedness*, and he claimed that a field should be based on this ethos in order to be a science. To briefly explain, organized skepticism leads scientists to criticize each other's work; to fix their errors or to improve their results. However, there is an organized silence and blindness between pseudoscientists. As Thagard's examination on this issue, pseudoscientists are stagnant, turning to resemblance thinking and neglecting to acknowledge empirical facts (Thagard 1978; Thagard 1988). His approach is going to be explained more in the next pages.

It is worth mentioning that the falsifiability, progressiveness, and verifiability are three criteria, which seems agreed most. I am not going to discuss the other suggested standards here in the name of demarcation. I would like to explain the pseudoscientific position of astrology, which I preferred as the case for this essay.

2. Astrology as a Pseudoscience

Astrology is one of the widely known pseudosciences and the objections to its scientific pretension do not belong only to the modern era. Isidore de Seville was the first scholar who separated astrology from astronomy and claimed that astrology was superstitious in his book *Etymologies* in the 7th century (Pines, 2015). Although astrology was perceived as another natural law — at least until Isaac Newton found out the universal law of gravitation (Thorndike 1955) — several Latin and Arabic scholars partly objected to the astrology, for either logical or religious reasons. Testing the astrological arguments in a modern scientific setting began in the 20th century after astrology became a public matter by the help of print media, and some astrologers claimed that they could support their hypothesis with empirical data. Some scientists felt responsible to refute these allegedly confirmed claims and they performed some tests to the astrological hypotheses and showed that the assertions are nonsensical (e.g. Carlson, 1985; Dean, n.d., 2003; Dean & Kelly, 2003; Mayberry, 1990; McGrew & McFall, 1990; Silverman, 1971).

On the epistemological side of the matter, most philosophers and historians consider the astrology a branch of pseudoscience; however, it is difficult to find a consensus on main reasons (Thagard, 1978). According to Popper (2002), astrology should be labeled as pseudoscience because it does not establish falsifiable assertions. Nevertheless, Popper's claim is not sound because not all the pseudoscientific arguments are unfalsifiable (Gardner 1957). Resnik (2000) gives the "The planet Mars causes violent behavior" argument as an example from astrology, which is not unfalsifiable but simply false. According to Kuhn (1970), the unscientific position of astrology comes from the fact that the field is neither failing to be falsifiable nor having proponents with failed predictions. Rather, it stems from its practitioners, who cannot find the puzzle to solve, which interconnects astrology to the "normal sciences" (Mayo, 1996). According to Bunge, *research field* and *belief field* terms may be used instead of the "science" and "pseudoscience" terms, and astrology pertains to the belief field for not only its resistance to accept new facts but also for the fact that its arguments rely on postulates, which contradict to our knowledge from scientific fields, especially biology, genetics, physics, and astronomy (Beyerstein, 1995). These postulates are speculative and products of imagination. According to Bunge (2011), science does not exclude speculation, and it allows practitioners to speculate, too. However, it disciplines the imagination of scientists, contrary to astrologers, who put no limit on the imagination. According to him, the allowance for unlimited imagination makes astrology an art rather than a science.

In fact, all the aforementioned experiments might have been performed by astrologers, if they had been interested in verification or falsification of their arguments. In other words, if astrology were not a pseudoscience, practitioners would reveal curiosity for testing the astrological hypotheses and questioning them, if you will. The difference stems from the following question: Why do we call the proponents *astrologers* while giving no particular title to the rest or simply call them *scientists*, who are genuinely curious about the truth of astrology? These questions lead us to focus on the behaviors of practitioners of a given field rather than the fields itself.

3. Thagard's Practitioner Based Approach

I am going to locate this article on Thagard's claims, which suggests that because a field does not only comprise the theories and its applications but also includes its practitioners, leads us to think it has a social dimension

in addition to an epistemic one. Furthermore, Thagard claims that demarcation problem approaches should be pseudoscientist-centered who are characterized by non-progressiveness, negligence and the ignorance of the facts, rather than pseudoscience-centered. He listed the differences between science and pseudoscience practitioners comparatively as the following five items (1988):

First, scientists use correlation thinking while pseudoscientists use resemblance thinking. Resemblance thinking is a way of thinking based on physical or conceptual similarities. For example, when a scientist is asked to consider if people with red hair are hot-tempered, he would think to take a sample and examine the correlation. However, pseudoscientists' arguments would be based on the connotation of red color, such as attributing the meaning of the red color to the blood, war, and aggression. It is not a surprise to see them claiming the Mars planet was related to these connotations of red color (Thagard 1988). Second, a scientist "seeks empirical confirmations and disconfirmations" while a pseudoscientist neglects empirical matters. This tendency implies an aversion to testing the field's arguments. Third, a scientist takes the alternative theories into account while a pseudoscientist is disinterested in them. Fourth, former establishes consistent and noncomplex theories, while pseudoscientists usually form elaborate theories, typically based on *ad-hoc* hypotheses. Finally, one can be described as progressiveness, meaning the openness of science to the development and regulating the new facts with efforts to establish new explanations. Thagard claims that pseudoscientists are stagnant in their doctrine, and they do not consider those comparative theories are superseding the old ones. Thagard (1978, p. 228) summarizes his ideas with the following demarcation criterion:

A theory or discipline which purports to be scientific is pseudoscientific if and only if:

- 1) it has been less progressive than alternative theories over a long period of time, and faces many unsolved problems; but
- 2) the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concern for attempts to evaluate the theory in relation to others, and is selective in considering confirmations and disconfirmations.

Thagard (1988, p. 162) suggests that “in attempting to decide whether a field is scientific or pseudoscientific we can take into account, among other factors, the behavior of practitioners of the field in empirical matters.” An argument such as “If x field whose practitioners use resemblance thinking, then x is a pseudoscience” is stronger than the opposite (Thagard 1988, p.171). Derksen (1993) agrees with him, by stating that practitioners are to blame for all misconceptions, but not the field.

Thagard (1978) highlights that testability and falsifiability criteria are not applicable for astrology because its arguments are vaguely testable, falsifiable and verifiable. Therefore, a scientific inquiry is possible to the field. So he emphasizes on the development rather than the epistemological situation of its arguments. According to him, astrology has not revealed any significant progress since Ptolemy despite the progress in the astronomy (Thagard, 1978). A serious habit of the astrologers is the eagerness for protecting the traditionalist structure of the “art”, so astrology is very much outdated, contrary to the knowledge of science, which is updated day by day. Bunge (2011) calls this property “changeability” which refers to the efforts for enriching and revising the knowledge at the hand and he concludes that the evolution of the pseudosciences does not depend on research. In fact, Zodiac has been shifted since the primary astrological sources were established due to the precession of Earth, and the dates of Zodiac signs have already been changed. However, there is not any revision made on astrology literature. I would like to remind readers that the current categorization of Pluto (not defined as a planet anymore) is another example. One can object to this example, with claiming the unimportance of artificial categorization of the celestial bodies by astronomers, but consistency is necessary for science: Several dwarf planets have been discovered in last decades, and yet their effects are still not applicable to astrological calculations.

It can be assumed that the practices which are not relying on observations –and facts- contain fallacious arguments (Nieminen and Mustonen 2014). In other words, when there is not any logical basis for a given field or argument, proponents of the field or argument may commit logical fallacies, for persuading their audience or as an attempt to refute their opponent’s claims. For instance, when Zodiac shift or new dwarf planets are reminded to astrologers or the necessity of a measurable and observable force that affects the personality of individuals, it is possible to get a fallacious response based on nonsense, for the sake of protecting

the tradition. Clearly, fallacies are particularly useful to the practitioners of a bogus discipline, in order not to lose prestige or audience against the factual inquiries. Indeed, the community of pseudoscience practitioners may commit numerous fallacies to rescue the failures rather than developing theories to solve the problems or contradictions with the facts, by showing no concern to evaluate these alternative theories and reaffirming with confirmation bias.

Thus, we can expect astrologers to commit logical fallacies for avoiding testability, defending their unsound arguments and ignoring the counter evidence. Observation of strong tendency for committing fallacious arguments is fulfilling the Thagardian approach because it is a perceptible indication of the "...little attempt to develop the theory towards solutions of the problems, shows no concern for attempts to evaluate the theory in relation to others, and is selective in considering confirmations and disconfirmations" (Thagard 1978). Nine of these fallacies are listed in the next section.

4. Logical Fallacies Committed by Astrologers

Frequently used informal logical fallacies by astrologers are listed below and given with some examples and explanation, including the Thagardian attribute they refer. As seen in the examples listed below, some fallacies directly relate to the non-progressiveness of the field, or to the resemblance thinking style of the astrologers.

4.1. Ad Hominem

An *ad hominem* argument is used to counter another's ideas or claims by attacking the person, or by pointing out a negative quality to that person, rather than addressing the argument itself. According to Walton (1998):

The *ad hominem* or personal attack argument is frequently the immediate defensive response to any new and powerfully upsetting argument on a controversial and polarized issue, especially when interests are threatened, and emotions are running high on the issue

Consistent with Walton's claim, it is possible to find an *ad hominem* argument as a counter-argument when contemporary scientists criticize the astrology. They usually rely on another fallacy and state that modern

scientists are blind, or that their opponents are members of orthodox scientific communities, who want to hide the facts. Several *ad hominem* fallacies that are attacking the skeptic scientists, such as, by claiming that they are just trying to sell their books or trying to be a celebrity. Following explanation is directly quoted from a website owned by Robert Currey, trading under “Equinox Astrology” brand operating retail shops in the USA, UK, and Australia.

Those at the top of the multi-million dollar “Skeptical Industry” make a comfortable living and notoriety through popularizing their beliefs. There are lucrative conferences, lecture circuits, books, magazines and journals to promote and like an evangelical church, donations are encouraged by playing on the fears of the faithful. (Currey 2017)

Furthermore, a particular kind of an *ad hominem* is a circular attack which is based on presenting the birth chart of the opponent as an evidence that opponent is having bad intents, as Pigliucci and Boudry (2013) stated. In such cases, the opponent is accused of harboring a personal prejudice or anger toward astrology — as “clearly” foreseen in his own horoscope.

Another particular kind of this fallacy is common with creationists, which is shown by Nieminen and Mustonen (2014), questioning the scientific qualification of the opponent. Just identical to the creationists’ argument such as “Darwin is not a scientist”, they are accusing the skeptics not being a scientist. An equivalent fallacy was committed by a Turkish astrologer, for attacking to the author of this paper, who wrote a book about the scientific status of astrology as below (Dölen 2015):

Despite he is an aeronautical engineer and has no information about the field [astrology], he is introduced like a scientist ... He can only be accepted as a science fan who was graduated from university.

Frequent use of *ad hominem* clearly indicates the oblivious and ignorant state of astrologers toward alternative theories or any contradiction to their hypothesis by paying attention to the opponent’s himself instead of the premises and trying simply undervaluing them.

4.2. Appeal to Authority

This fallacy is based on the premise that anything stated by a person of authority, or by an expert in a given field, is innately true.

Following example is directly quoted from a popular astrologer Binnur Zaimler's (2012) column with "10 reasons to believe in astrology" title, printed in the *Hürriyet Newspaper* on 2nd December:

Kepler, who distinguished matter and soul, who was a pioneer for the end of middle age and the beginning of the Renaissance, was a good astrologer ... Ali Kuşçu, the chief fortune-telling adviser of Fatih Sultan Mehmet [Sultan Mehmed II], was a good mathematician, astronomer, and astrologer ... Hippocrates, the father of medical astrology claimed that each organ is connected with a planet

Simply referring to these historic figures' interest to astrology is not a fallacy. However, Zaimler presents these names as a "reason to believe in astrology", so it is an appeal to authority fallacy, by claiming, "believing astrology is good; you must believe in it because they were believing in it" implicitly.

In another article, explaining the "esoteric astrology" proposes the force of astrology by appealing to authorities like directly quoted below:

Is it possible to talk about an effect coming from skies, in terms of present-day science? Not only it is possible but also mentioning a human isolated from the universe is equal to refusing the scientific findings. It is not a coincidence that Copernicus, Tycho Brahe, Kepler, Galileo and Newton, who were the founders of the contemporary astronomy were astrologer at the same time. They were open-minded scientists and were believing in certain results which they obtained from their observations and experiences. None of them talked about evidence insufficiency of astrology. (Menemencioğlu 2017)

In this example, the author uses known scientists to support his argument again like the previous one. Additionally, the author tries to argue that the denial of the validity of astrology is equal to being narrow-minded and being in an anti-science position.

These names are frequently mentioned while defending astrology. To not commit the fallacy of fallacy, it is worth to say most of the mentioned middle age scholars were really interested in astrology and using astrology in their personal or professional lives. However, they lived before the rise of rationalism, and so the demarcation between science and pseudoscience was not a hot debate. In fact, astrology was popular through the 17th century, not only among intellectuals but also among the public, until it was assaulted by the Enlightenment scholars like Swift and Voltaire in the 18th century (Thagard, 1978). In other words, Kepler and Newton did not take astrology into account in a “correlation thinking” setting, as it was not a notorious field at the time (Thagard, 1988) and even astrology was perceived as another valid natural law (Thorndike 1955).

Institutions may be appealed as an authority sometimes. For example, there is a book dedicated for arguing that astrology is a science, which is called “Why astrology is a science: Five good reasons” written by Tapan Das. In his book, Das (2009) has a title “Noted practitioners of astrology”, including the following claims:

During this period, astrology and astronomy went hand in hand. There was no bitter distinction between them, as it is today. Medical practices also were entwined with astrology. Astrology was taught at academic centers along with philosophy, arts, music, architecture, and politics. There was little antagonism between astrology and the Church at that time; in fact, astrology was practiced by Church

Here, both academy and church are proposed like an authority to support the scientific status of astrology. Zaimler (2012) also presents the existence of astrology courses at medical faculties until the 16th century, as a reason to believe in astrology. Institutional authorities have not to be historic. In Turkey, some astrologers claim that astrology has already been accepted as a science branch in developed countries and has been taught in universities (e.g. Dölen 2014; Ceyhan 2009). Uyar (2016) showed that this claim is not true because the mentioned institutions are either not a part of the official academic system or formal graduate courses not teaching astrology but explaining its effects to the societies in the humanities context as expected from a social science program regarding the science and culture history.

It is worth mentioning other false claim used as a premise for authority fallacies, such as Albert Einstein was professedly a proponent of astrology. For example, Mann (2004) clearly states that Einstein was one of

the great thinkers who was practicing astrology at his book's preface and he presents a quote favoring with astrology which apparently belongs to Einstein - but it does not-. Whereas, there is a letter written by Albert Einstein in 1943 revealing that Einstein agrees with the pseudoscientific position of astrology; and the claimed quote which embellishes a lot of astrology books is misattributed to Albert Einstein (Usher 2013). The claim is utterly false and there is not any supporting evidence.

The frequent use of this fallacy is related to non-progressiveness of the field, due to its purpose to deny progress of the scientific knowledge since the 17th century.

4.3. Appeal to Tradition / Antiquity

This fallacy aims to support a conclusion based on the assumption like "something is better or correct simply because it is older, traditional and *'always has been done'*" (Labossiere 2010).

Astrology is often defended by mentioning it has been survived for "thousands and thousands of years" and build on the knowledge which has been collected from these "thousands and thousands of years". In other words, it is promoted just by highlighting its antiquity.

I will directly quote from Zaimler's (2012) "Ten reasons for believing in astrology" again. According to her, the following reason may be a premise to the "believing in astrology is good" conclusion:

Different astrology approaches which are overlapping one another can be found in many culture's roots. Sumerians built an observatory to understand the effects of skies.

I will provide another example from social media. When Metin Uca, who is a public figure in Turkey, promoted a book, which criticizes astrology by defining it "a charlatanry degrading our minds" ¹ in Twitter, one proponent of astrology replied to him as follows:

Please research astrology well before insulting such an ancient knowledge which enlightened several science branches and has persisted for ages.²

¹ Metin Uca, Tweet Post, November 15, 2016, 18:14, <https://twitter.com/MetinUca>

² Cagla Ercanoglu, Tweet Post, November 16, 2016, 23:25, <https://twitter.com/caglaercanoglu>

Some astrologers highlight “ancient” word in a positive meaning while promoting it or their products. This effort may influence the book names: *Astrological Gardening: The Ancient Wisdom for Successful Planting & Harvesting by the Stars* by Louise Riotte (1989). *Earth Mother Astrology: Ancient Healing Wisdom* by Marcia Starck (1989), *Sex, Love, and Dharma: Ancient Wisdom for Modern Relationships* by Simon Chokoisky (Chokoisky 2015) are just three examples, which starts to support their content by highlighting the antiquity of the field at the book title.

The frequent use of this fallacy is related to the non-progressive nature of the field, because of the tendency to stand on the past without making an effort to continue researching the discipline. It reinforces the notion that the field is nothing more than a stagnant doctrine.

4.4. Biased Sampling & Post Hoc Ergo Propter Hoc

The biased sample fallacy involves supporting a conclusion with biased samples, which are cherry-picked to support the conclusion part of an argument, and nothing else.

The other fallacy, shortly *Post Hoc*, named with a Latin phrase meaning “After this therefore because of this”. The person commits the fallacy by arguing that one event caused another, just because of they are sequential.

These two fallacies go with each other when astrologers intend to give historical examples for proving the effect of important celestial events. Some cases provided below:

Black Death is an infamous example of both biased historical sampling and post hoc argument was used to illustrate the powerful effects of a triple conjunction. In 1345, a triple conjunction of Jupiter, Saturn, and Mars occurred not long before the plague killed millions in Europe, so the priests decided that the plague was the result of this triple conjunction. Astrologers used this logic as a crutch of sorts, although later conjunctions did not correlate with similar dramatic events. This example is a clear cherry-picking and the illusory causation only relies on the fact they are consecutive.

Another *Post Hoc* evaluation of history come from Gover (2005), who

argues the end of Thirty Years' War in 1650 and the "breakup of the Turkish Empire" in 1821³ are the pieces of evidence for the effects of Uranus-Neptune conjunction (occurs every 171 years), because conjunction leads to uncertainty in alleged Neptunian properties, inspirations and delusions; and innovation interacts with "fear and illumination"⁴. Obviously, the deterministic relationship between celestial and historical events is fictive and supported just because of their chronological order.

There is another example, which connects the birth of notable people to the celestial events. Astrologer Demirci is cherry-picking Nostradamus, Isaac Newton, John Lennon, Blaise Pascal and Victor Hugo, to support her claim that Saturn-Jupiter conjunctions lead to the birth of people who influenced the societies (Uyar 2015). Causation and correlation seem illusory, due to many more people who have no influence on the societies were born on the same days too and many more influential people was born on the other days which are not a day of conjunction.

These are plain examples of *Post Hoc*, originating from lack of a factual explanation and a confirmable mechanism to answer why conjunctions create such events. Besides, the claimed correlations between conjunctions and notable events/people are not only false but also illusory by ignoring the negative evidence. These examples are also examples of confirmation bias, a reluctance to researching the matter and a tendency to simply make an assumption by relying on only the confirmatory pieces of evidence; and according with Thagard's claim about the negligence of all empirical materials.

4.5. Appeal to Faith

This fallacy relies on the claim that if a particular religion agrees with an idea, then it must be true.

In Turkey, astrologers continually refer to the Qur'an, the holy book of Islam, tacitly claim that since the Qur'an covers and validates the astrology, so a Muslim must believe in astrology. There are some books

³ Gover intends to refer the Ottoman Empire. However, this date is not true for breaking up of Ottoman Empire and it is unknown why author claimed that Ottoman Empire had broken up in that year.

⁴ Uyar (2015) showed that Gover's reasoning relies on an illusory correlation, by presenting similar events in the World history in 1640 & 1811 years (ten years before conjunction) and 1655 & 1826 years (five years after conjunction).

particularly based on supporting the necessity and validity of astrology with religion.

For example, the main purpose of Ergin's (2006) book, *Astrology in Islam*, is to provide evidence from Qur'an and Islamic mysticism resources to produce the validity of astrology. There is another book with the same title for the same purpose authored by Özcimbit & Özcimbit (2011).

On a side note, I would like to mention that this argument is false too. According to theologian Davut Ağbal, Qur'an refer to the constellations as mere celestial bodies, does not mention anything about their effects on people and societies. He also claims the constellations concept in the Qur'an is different than astrology (Kılıç 2013).

Correspondingly, the use of this fallacy directly relates to unverifiable, faith-based arguments. Moreover, it is also an indication of the fact that the astrology discipline is a member of the belief field. Bunge (2011), in turn, claims that the pseudosciences are connected to faith, as both are based on idealist ontology, idealist epistemology and heteronomous ethics.

4.6. False Analogy

This fallacy is an inductive argument that consists of utilizing observed similarities as a premise to support a conclusion that allegedly shows the same similarity.

These fallacious analogies are used for two purposes: First, to fill the gap of lacking physical mechanism with an observable alternative. For example, a Turkish astrologer claims the following argument on his website, under the "Moon at the Health Astrology" title⁵:

Moon is generally responsible for the tides of our body liquids (serum levels, water, blood). Like the rise and fall of oceans at the coast, our body liquids rise and fall too in their physical shells...

Similarly, another astrologer Döşer (2014) commits the same fallacious argument to explain the influence of the Moon on the people.

Weather events are atmospheric tides, which are the product of the

⁵ "Sağlık Astrolojisinde Ay", <http://astrogufran.com/?p=700>

gravitational force of the Moon. Tidal effect of the Moon influences every solid, liquid and gas, even lands are rising with the effect of Moon. [...] Most effective forces in our Solar System are established by the Moon and the Sun, such as tides. Tides are the product of the Moon's elliptical orbit and rotation of the Earth. The Moon affects human's daily life even by this fact. [...] The Moon's gravitation is equal to 2.5 times of the Sun and we can understand how much it influences our lives. With this effect, people, animals, and plants change, and none can stay stable with their thoughts and behaviors.

Second, this fallacy may be committed for the sake of giving a response to "why we should believe in astrology is true".

The direct quotation below reveals that purpose, by establishing an analogy between celestial bodies and people, with an implicit appealing to the religion:

While describing human, saying 'this is a simple animal made of meat and bone. It has not got a soul and an eternal life. It changes and runs out' is a product of primitive and narrow-minded approach; it is equally primitive and narrow-minded to qualify stars as 'these are simple stars. They are born and they die! They are not alive and they are inanimate. They have no purpose, no effect and not affected (Bayrakçı 2017)

False analogies are a product of the resemblance thinking style. There is no rational basis to establish parallelism between oceans and body liquids or celestial bodies and people.

4.7. Etymological Fallacy

This fallacy assumes that the current meaning of a phrase is the same as its historical meaning while ignoring all evidence that the language — or even the meaning — have since evolved (Bennett 2015).

Because of the "-logy" suffix in the *astrology*, astrologers frequently commit this fallacy, especially in the introductory texts. The influence of this suffix on laypeople has already been determined by a field research, as subjects rated the word "astrology" as "very scientific" significantly more than they did the word "horoscope" (Allum 2011). This result

reinforces that when an astrologer commits an etymological fallacy, there is a significant chance of success in persuading the target.

Also, another example of etymological fallacy is the word “disaster.” Disaster means “bad star” in Latin (*dis-* means “bad,” while *-astro* means “star”), and the phrase emerged from the belief that disasters happen as the result of the positions of celestial bodies (Sagan 2009). This etymological root is used to support the negative effects of previously mentioned conjunctions.

4.8. Appeal to Celebrity or Riches

Appeal to Celebrity and *Ad Crumenam* (*Appeal to Riches*) fallacies are based on a premise that when a person who is wealthy or famous agrees with an idea, then that idea must be correct. This fallacy is not only trying to increase the perception regarding the truthiness of astrology but also used as a marketing strategy as well. Astrologers often refer to celebrities or wealthy business people who purchase astrological consultations. Zaimler’s (2012) newspaper article claims that “day by day, the number of leaders and businessmen who consult with astrologers increases,” and refers to the quote of J. P. Morgan: “Millionaires don’t use astrology, but billionaires do”.

4.9. No True Scotsman

No True Scotsman fallacy is another fallacy committed by astrologers when bad examples of astrological discourse are reminded to them. This fallacy is a counter argument to the refutation of any universal argument which is altering the object or subject of the refutation to a specific or excluded area instead of revising or conceding the truth (Bennett 2015). When unsound or flawed arguments of astrologers are given as examples or any astrological hypothesis is refuted, it is possible to face with a counter argument which is excluding the relevant astrologer from “true astrology” discipline. To be more clear, the fallacy is committed by labeling the another astrologer as an ignorant or a charlatan, and accusing her/him of not researching the “true astrology” well, without providing any explanation to “what is true astrology?” or “who is a true astrologer?” questions.

Because of *organized silence*, it is difficult to find astrologer articles committing “no true astrologer” fallacy in print media, however, it can be

found in live TV programs where they have to defend their field against a refutation effort or a criticism to his/her colleagues⁶.

5. Discussion and Conclusion

Pseudoscience is an imitation of science, a belief field against a research field (Beyerstein, 1995), as well as a form of anti-science (Holton 1992) and nothing more than a modern superstition (Adorno 2002). The demarcation criteria between pseudoscience and science were discussed from a number of different perspectives. One of them suggests that we should focus on pseudoscientists rather than pseudoscience (Thagard, 1978, 1988).

The lack of critical thinking skills (unintentionally) and reluctance to verification and progressiveness (intentionally) lead pseudoscientists to commit fallacies, contrary to the scientists who are not expected to state spurious claims in fallacy form. In this article, I used Thagard's pseudoscientist-centered demarcation context as the basis, and I suggested to use the logical fallacies as an alternative tool. In other words, the fact that "true scientists" are not eager to defend their ideas through the fallacies when compared to "true believers", the tendency of practitioners to commit fallacies and the frequency of this behavior may be a secondary tool for demarcation.

One might suggest this approach also indicates the non-sciences, as their proponents also use fallacies more often than the scientists do. However, this is the case for all other criteria. As stated Boudry et al. (2014), pseudosciences have a *model science* to act like it, while others not, which draws a clear line between the pseudoscience and the non-science. So, it is not necessary to demarcate between non-science and science by the tool which I suggested in this paper.

Nieminen and Mustonen (2014) who revealed the fallacies committed by creationists against evolutionary theory, suggested that the recognition of the fallacies and dismissing them as irrelevant is important especially when the audience has some biases. I agree with them and claim that being aware of logical fallacies is also useful in distinguishing science.

⁶ e.g. "Yıldızlar karakterimizi ve gündelik hayatımızı etkiliyor mu?" In Gündem Özel. CNN Türk. August 19, 2017. <https://www.youtube.com/watch?v=zqBVUSsnARI>

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